

having any real foundation in fact. For it must not be forgotten that, however certain questions now pending concerning the nomenclature of the Welsh strata may eventually be decided—and these questions of nomenclature and priority are, after all, of very secondary importance—the grand fact first clearly determined by the discoveries of the illustrious Barrande in Bohemia, that there can be distinguished in the series of older Palæozoic strata three great divisions, each characterised by a well-defined fauna, is quite independent of these controverted points, and its value cannot be affected in any way by their decision either one way or the other.

It will be manifest from what we have said above that we regard the present work of Prof. Nicholson as dealing with a subject in connection with which the want of a competent text-book in this country has long been a serious evil; and of the general accuracy and reliability of the information supplied by this convenient little volume we can also speak in terms of high commendation.

Prof. Nicholson has wisely availed himself to the fullest extent of woodcut illustrations in aid of his descriptions of the fossil forms; and the 270 engravings, many of them containing illustrations of a number of different species, will be a great boon to the geological student. Some of these woodcuts now appear for the first time, but others have already done duty in the author's previous writings. We cannot unfortunately award anything like equal praise to all these illustrations, for while some of them are of exquisite truthfulness, detail, and finish, certain others are so coarsely executed and so wanting in character, that it is a marvel to us how so accomplished a naturalist as the author could have ever permitted them to disfigure his pages. There is one omission in connection with the illustrations, which will greatly detract, we fear, from the value which they would otherwise have for the student, namely, the absence of indications of the number of times which the scale of the drawings is magnified or reduced from that of the original objects. Every one engaged in teaching is aware what erroneous notions concerning fossil forms are often propagated by want of attention to this detail.

In his discussion of the characters distinguishing the flora and fauna of each of the great geological periods, Prof. Nicholson is usually very clear in his descriptions and happy in his choice of typical forms. The greatest danger which besets the writer of such a work as the present is that of overwhelming the student with masses of detail, unrelieved by those broader generalisations which may serve to aid his memory in grouping the facts about convenient centres. Had Prof. Nicholson in the present work prefaced each of his descriptions of the great geological periods with a succinct statement of its leading palæontological characteristics, and also furnished similar summaries for the greater epochs, we cannot but think that the work would have been far better adapted to the wants of the student, and at the same time its suitability for general readers would have been in no wise impaired.

The references to authorities at the end of the chapters will be found useful by all classes of readers, and the general remarks on the "Principles of Palæontology" with which the work opens will sufficiently prepare those who may be totally unacquainted even with the funda-

mental facts of geological science for a profitable perusal of the succeeding chapters. The work before us constitutes a popular exposition and summary of the facts of palæontology, suitably arranged for beginners; but as a text-book for the more advanced student of the science, it still leaves much to be desired. We search it in vain, for example, for information on many important questions, such as the classification of the multifarious forms grouped under the name of *Ammonites*, and we sometimes find obsolete names employed for certain genera and species. There are certain obvious errors and omissions which will doubtless be corrected and supplied in a subsequent edition of the work—such, for example, as the table of Cambrian strata on p. 79, and the absence of all notice of the remarkable Devonian fossil, *Calceola sandalina*.

As a compact and popularly written introduction to a very important department of science, Prof. Nicholson's new work may be safely recommended; and it is well worthy to take its place among that series of useful manuals for which we are already indebted to its industrious author.

OUR BOOK SHELF

Geological Survey of Canada. Report of Progress for 1874-75. Alfred R. C. Selwyn, F.R.S., F.G.S., Director. (Published by Authority of Parliament, 1876.)

ALTHOUGH Mr. Selwyn, like his predecessor, Sir William Logan, has the highest possible ideal of the importance of pure geological mapping, the necessity for the rapid exploration of a vast unsurveyed new land simultaneously with the development of rich coalfields, compels him to employ two very different systems of working. With a staff of only ten geologists, two-thirds of whose time is engrossed by topographical preliminaries, the usefulness of the survey as a whole must depend to a great extent on the judicious determination of the degree of importance attached to the details of its various parts. Accordingly, Mr. Selwyn has confined the detailed mapping to the settled eastern sea-board, carrying on at the same time reconnaissances in the central and western regions, where complete maps will not be demanded for some time to come.

During the past year Mr. Selwyn has been able, in addition to his administrative duties, to overtake some field-work, chiefly among the palæozoic rocks of New Brunswick and the coalfields of Cumberland and Sydney. The Report contains two geological maps of portions of the Cape Breton Coalfield, by Messrs. Robb and Fletcher, exhibiting all the completeness of the British coalfield maps.

Mr. R. W. Ells furnishes a map and report on the hematite ores of Carleton County, New Brunswick. The ore appears to occur in veins along the strike of highly-inclined Silurian rocks.

Mr. Henry G. Vennor has been surveying in the Laurentian region of Frontenac and Lanark Counties, and embodies the results of his labours in a map and report. It appears that apatite mining in this district has recently ceased to be a profitable industry. Mr. Vennor sees the cause of failure in the injudicious and costly manner in which the mining was carried on. Iron ore (magnetite) occurs at Eagle Lake in a bedded form, associated with hornblende and dioritic rocks.

Mr. Robert Bell and Mr. Joseph Spencer describe the country between the head-waters of the Assiniboine River and Lakes Manitoba and Winnipegosis. During a rapid survey of this little-known tract, they recorded the occurrence of Laurentian schists and rocks of Huronian,

Devonian, and Cretaceous age. They also made many valuable observations on the superficial deposits, as well as on the physical geography of the region. An interesting point in their report is the frequency of old beaver-dams in places where there is now little or no water—an evidence of the former greater humidity of the climate.

In British Columbia Mr. James Richardson continued his explorations. He traversed metamorphic crystalline rocks (auriferous) extending over seven degrees of latitude and six of longitude. The complicated structure of the Nanaimo coalfield was further investigated, but the work is not yet complete.

Mr. J. Lionel Smith reports on the salt manufacture and trade of Ontario, and makes some interesting and useful comparisons between the various processes for the treatment of the brine in Canada and elsewhere.

Mr. J. Harrington closes the volume with notes on Canadian rocks and minerals.

R. L. JACK

The Schools of Forestry in Europe. A Plea for the Creation of a School of Forestry in Connection with the Arboretum at Edinburgh. By John Crombie Brown, LL.D., &c. (Edinburgh: Oliver and Boyd.)

THIS pamphlet is written in the form of a letter or address to the Lord Provost of Edinburgh and the promoters of the Arboretum at Inverleith, and is in short a strong argument in favour of the formation of a school of Forestry to be connected with the Arboretum. Dr. Brown shows that in France, Spain, Italy, Austria, Poland, Russia, Finland, Sweden, and in fact in almost every country except Great Britain, its Colonial dependencies and the United States of America, such schools exist under Government authority, and it is in these very countries that such schools would be of immense utility. The proposed curriculum of three years' study sketched out by Dr. Brown as likely to prove advantageous is, in the main, good, but we think that the French and German languages should be taken before the end of the third year. The notices of the arrangements and systems of studies in the various Continental forest schools are not without interest. Dr. Brown concludes his "plea" with a comparison of the English and Continental forests; the extent of the latter, together with the threatened lack of fuel by the extinction of forests as against our supplies of this necessary article from coal mines, being, no doubt, among the principal causes of the decrease of forest training in this country. The lack of special literature on the subject in the English language also compares badly with that of the Continent.

Unser Sonnenkörper nach seiner physikalischen, sprachlichen und mythologischen Seite hin betrachtet. By Dr. Schmidt. (Trübner, 1877.)

DR. SCHMIDT has more learning than method. In fact, he belongs to that school of paradoxers who are less common in Germany than in this country. He proposes to show that the sun is a cold inhabited body, heat being developed by the friction of its rays against the earth and other celestial bodies. Upon this physical theory he superimposes his mythological one. Words which have a slight resemblance in sound and meaning are gathered together from all parts of the world and assumed to be connected in spite of their belonging to different families of speech. Out of this hodgepodge are extracted such conclusions as that the sun-god was believed to illumine the dead in Hades or that the snake represented the return of Apollo to the light of day. But the philology of the writer may be easily appreciated when we find him speaking of "the Armeno-Caucasian family, to which belong not only Semites and Aryans, but also some Turanian tribes," and intimating that the roots of the Chinese language are allied to those of the "Armeno-Caucasian." As might have been expected, Dr. Schmidt

is not always right in the words he quotes from the numerous languages, ancient and modern, which he has laid under contribution.

LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications. The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to ensure the appearance even of communications containing interesting and novel facts.]

Passage of Plants Across the Atlantic—*Haplomitrium hookeri*, Lyell

PROF. UNGER arrived at the conclusion that in Tertiary times there was a passage of plants from America to Europe. A plant found by myself last year in the Island of Dominica, West Indies, led me to think it probable that there had been an extension of at least one plant in the opposite direction. The plant to which I refer is one of the Hepaticæ, *Haplomitrium hookeri* of Lyell. It differs so much from other Hepaticæ that I was able approximately to identify it on the spot where I found it in considerable abundance. Should it prove to be specifically distinct, my remarks may still, to some extent, hold good. It was growing in a dark, moist, shady spot on the north side of a mountain at an elevation of about 4000 feet. *H. hookeri* is generally distributed over the North of Europe, but I cannot find that it has ever before been found out of Europe. Dr. Oliver kindly informs me that there are only European specimens in the herbarium at Kew. I have failed in obtaining information of its occurrence either in North or South America, or in the intermediate islands. Nees ab Esenbeck, in his "Synopsis Hepaticorum," whilst recording a large number of Hepaticæ from the West Indies, mentions *H. hookeri* only from Europe. Now it is by no means an inconspicuous plant, and it seems altogether unlikely to have been overlooked by such careful observers as Swartz and others who have studied the Hepaticæ of the West Indies. Hence I draw the following inferences, to which may be attached a greater or a less amount of probability.

1. That the biological centre for *H. hookeri* is Northern Europe.
2. That it has thence crossed the Atlantic in a rather narrow zone.
3. That it did not reach the Continent of America. This, of course, is subject to correction. It may have been found there. From the great extent of territory and variety of climate on the mainland, I think if it had ever reached America it would still be found there.
4. That it may have reached the West Indies and have died out from Cuba, Jamaica, and other islands, through the prevalence of dry seasons, before the lower Cryptogamic plants were studied by competent botanists.
5. That it has remained in Dominica because of the altogether peculiar moisture of the climate in that island.
6. That it has not hitherto been found in Dominica because, from some reason unknown to myself, botanists seem to have neglected this true pearl of the Antilles, matchless in the beauty of its natural scenery, and in the wealth of its Cryptogamic flora.

H. hookeri is noticed as peculiar in not recovering its freshness when moistened after having been dried. This I found to be the case. On being carefully moistened about eight months after it was collected and dried, it remained flaccid, whilst the rest of the mosses and Hepaticæ from Dominica, when similarly treated, looked as fresh as when they were gathered. But *H. hookeri* exhibited another peculiarity even more remarkable, for it alone of all the Muscinæ that I brought home, grew and produced fruit after so long a period of desiccation. The fruiting parts of a specimen which I sent to the herbarium at Kew were entirely developed in a moist case on the table at which I am now writing. It seems as if the plant, incapable of the imbibition or intussusception of moisture sufficient to restore the freshness of its foliage, nevertheless retained, in a very unusual degree, its capacity for such development as might secure the continuance of its species. Such a speciality no doubt favours the suggestion that *H. hookeri* may have crossed from the East, but I confess myself inclined to be suspicious when coincidences run too much on "all fours." I found many mosses in Madeira and several lichens in Jamaica, which I have been quite unable to distinguish from British species. These may be common cases of widely distributed forms. *H. hookeri* does not appear to be of this class.

HENRY H. HIGGINS

Rainhill, May 2